

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Listing of Claims:

Please cancel claims 2- 31.

32. (Previously Presented) A method of controlling a storage system, wherein the storage system comprises a first disk array system including a first storage volume provided at a first site, a second disk array system including a second storage volume provided at a second site, and a third disk array system including a third storage volume provided at a third site, wherein the method includes steps of:

writing data from a host computer coupled to the first disk array system to the first storage volume;

transmitting the data written to the first storage volume from the first disk array system to the third disk array system synchronously with writing the data from the host computer to the first storage volume, to store the data in the third storage volume;

managing data written to the first storage volume after a first time as data to be transmitted to the second disk array system after a second time, which is subsequent to the first time;

transmitting the data, which are managed as data to be transmitted to the second disk array system after the second time, from the first disk array system to the second disk array system after the second time, to store the data in the second storage volume;

managing differential management tables including a first differential management table and a second differential management table by the third disk array system, wherein storing location information of data written in the third storage volume, which data are written to the first storage volume after the first time and transmitted from the first disk array system to the third disk array system, is recorded on the first differential management table, and storing location information of data written in the third storage volume, which data are written to the first storage volume after the second time and transmitted from the first disk array system to the third disk array system, is recorded on the second differential management table, and

controlling, by the third disk array system, to transmit a part of data stored in the third storage volume to the second disk array system to store the part of data in the second storage volume by using the differential management tables, if the first site is damaged.

33. (Previously Presented) A storage system comprising:

a first disk array system, in a primary site, coupled to a host computer, wherein the first disk array system includes a plurality of first disk drive units, in

which data are stored, and a first controller, which is configured to store data written from the host computer in a primary volume configured by the first disk drive units;

a second disk array system, in a remote site, coupled to the first disk array system, wherein the second disk array system includes a plurality of second disk drive units, in which data are stored, and a second controller, which is configured to receive data of the primary volume, which data are sent from the first disk array system by an operation of asynchronous remote copy procedure, and store the data received from the first disk array system in a secondary volume configured by the second disk drive units; and

a third disk array system, in a local site, coupled to the first disk array system, wherein the third disk array system includes a plurality of third disk drive units, in which data are stored, and a third controller, which is configured to receive data of the primary volume, which data are sent from the first disk array system by an operation of synchronous remote copy procedure, and store the data received from the first disk array system in a third volume configured by the third disk drive units,

wherein the third disk array system includes a memory area including a first area for storing location information relating to locations in the third volume, in which locations data written to the primary volume after a first time and sent from the first disk array system to the third disk array system by an operation of the synchronous remote copy procedure are stored, and a second area for storing location information relating to locations in the third volume, in which locations data written to the primary

volume after a second time and sent from the first disk array system to the third disk array system by an operation of the synchronous remote copy procedure are stored, wherein the second time is subsequent to the first time, and

wherein the first disk array system is configured to manage data written to the primary volume between the first time and the second time as data to be transmitted from the first disk array system to the second disk array system by an operation of the asynchronous remote copy procedure after the second time.

34. (Previously Presented) A storage system according to claim 33, wherein the third disk array system is configured to transmit a part of data stored in the third volume to the second disk array system by using location information stored in the memory area, when the primary site is damaged.

35. (Previously Presented) A storage system according to claim 34, wherein the third disk array system is configured to select data stored in locations related to the location information stored in the memory area, and transmit selected data to the second disk array system, when the primary site is damaged.

36. (Previously Presented) A storage system according to claim 33, wherein the third disk array system is configured to clear location information stored in the

first area after completion of transmission of the data, which are managed as data to be transmitted to the second disk array system after the second time.

37. (Previously Presented) A storage system according to claim 33, wherein the third disk array system is configured to transmit a lesser amount of data than all of the data stored in the third volume to the second disk array system by using location information stored in the memory area, if the primary site is damaged.

38. (Previously Presented) A storage system according to claim 33, wherein the third disk array system is configured to reduce an amount of data, that needs to be transmitted to the second disk array system, if the primary site is damaged, by using the memory area.

39. (Previously Presented) A storage system according to claim 33, wherein in each of the first area and the second area of the third disk array system, a bitmap is configured, on which the location information relating to locations in the third volume is recorded.

40. (Previously Presented) A storage system according to claim 33, wherein in the synchronous remote copy procedure, the first disk array system receives the data written from the host computer to the primary volume, transmits the

data to the third disk array system, and sends an acknowledgement to the host computer after the third disk array system receives the data from the first disk array system.

41. (Previously Presented) A storage system according to claim 33, wherein in the asynchronous remote copy procedure, the first disk array system receives the data written from the host computer to the primary volume, transmits the data to the second disk array system, and sends an acknowledgement to the host computer regardless of whether the second disk array system receives the data transmitted from the first disk array system.

42. (Previously Presented) A storage system according to claim 33, wherein after the second time, the first disk array system is configured to transmit the data written to the primary volume between the first time and the second time to the second disk array system, and manage data written to the primary volume after the second time as data to be transmitted from the first disk array system to the second disk array system after completion of transmission of the data written to the primary volume between the first time and the second time.

43. (~~Previously Presented~~ Currently Amended) A system for storing data comprising:

a first storage apparatus including a plurality of first disks and a first controller coupled to the plurality of first disks, wherein a first logical volume is configured by the first disks;

a second storage apparatus coupled to the first storage apparatus, wherein the second storage apparatus includes a plurality of second disks and a second controller coupled to the plurality of second disks, and a second logical volume for storing a copy of data stored in the first logical volume is configured by the second disks; and

a third storage apparatus coupled to the first storage apparatus, wherein the third storage apparatus includes a plurality of third disks and a third controller coupled to the plurality of third disks, and a third logical volume for storing a copy of data stored in the first logical volume is configured by the third disks,

wherein when write data to the first logical volume are received at the first storage apparatus, the write data are stored in the first logical volume, transmitted to the second storage apparatus by an operation of asynchronous remote copy procedure to store in the second logical volume, and transmitted to the third storage apparatus by an operation of synchronous remote copy procedure to store in the third logical volume,

wherein the first storage apparatus manages a first group of write data, which are received at the first storage apparatus before a first trigger to be stored in the first logical volume, as write data to be transmitted to the second storage apparatus by an operation of the asynchronous remote copy procedure, and manages a second group of write data, which are received at the first storage apparatus after the first trigger to be stored in the first logical volume, as write data to be transmitted to the second storage apparatus by an operation of the asynchronous remote copy procedure after completion of transmission of ~~write data of the first group of write data~~ data from the first storage apparatus to the second storage apparatus,

wherein the third storage apparatus records location information including first location information and second location information, wherein the first location information is related to locations in the third volume, in which locations write data corresponding to ~~of~~ the first group of write data received from the first storage apparatus are stored, and wherein the second location information is related to locations in the third volume, in which locations write data corresponding to ~~of~~ the second group of write data received from the first storage apparatus are stored, and

wherein the third storage apparatus clears the first location information after the completion of the transmission of the first group of ~~write data of the first group~~ from the first storage apparatus to the second storage apparatus.

44. (~~Previously Presented~~ Currently Amended) A system for storing data according to claim 43, wherein the third storage apparatus clears the first location information before transmission of the second group of write data ~~of the second group~~ from the first storage apparatus to the second storage apparatus.

45. (Previously Presented) A system for storing data according to claim 43, wherein the third storage apparatus includes a first bitmap, in which location information including the first location information is recorded, and a second bitmap, in which location information including the second location information is recorded.

46. (~~Previously Presented~~ Currently Amended) A system for storing data according to claim 43, wherein when ~~the first~~ a site related to the first storage apparatus is damaged, the third storage apparatus selects a part of write data of the third logical volume according to the location information, and transmits selected write data to the second storage apparatus to store the selected write data in the second logical volume.

47. (~~Previously Presented~~ Currently Amended) A system for storing data according to claim 43, wherein when ~~the first~~ a site related to the first storage apparatus is damaged, the third storage apparatus selects write data stored in locations specified by using the location information, and transmits selected write

data to the second storage apparatus to store the selected write data in the second logical volume.

48. (~~Previously Presented~~ Currently Amended) A system for storing data according

to claim 43, wherein after a second trigger after the completion of transmission of the first group of write data ~~of the first group~~ from the first storage apparatus to the second storage apparatus, the first storage apparatus manages the second group of write data as write data to be transmitted to the second storage apparatus by an operation of the asynchronous remote copy procedure, and manages a third group of write data, which are received at the first storage apparatus after the second trigger, as write data to be transmitted to the second storage apparatus by an operation of the asynchronous remote copy procedure after completion of transmission of the second group of write data ~~of the second group~~ from the first storage apparatus to the second storage apparatus, and

wherein after clearing the first location information, the third storage apparatus records third location information included in the location information, wherein the third location information is related to locations in the third logical volume, in which locations write data corresponding to ~~of the third group of~~ write data received from the first storage apparatus are stored.

49. (~~Previously Presented~~ Currently Amended) A system for storing data according to claim 48,

wherein the third storage apparatus includes a first bitmap, in which location information including the first location information is recorded, and a second bitmap, in which location information including the second location information is recorded,

wherein the third storage apparatus clears location information recorded in the first bitmap after completion of the transmission of the first group of write data ~~of the first group~~ from the first storage apparatus to the second storage apparatus, and before the transmission of the second group of write data ~~of the second group~~ from the first storage apparatus to the second storage apparatus, and

wherein the third storage apparatus records the third location information in the first bitmap after clearing the location information recorded in the first bitmap.

50. (Previously Presented) A system for storing data according to claim 48, wherein the third storage apparatus clears the first location information at a synchronous timing with the second trigger.

51. (Previously Presented) A system for storing data according to claim 43, wherein the third storage apparatus receives an instruction for clearing the first location information from the first storage apparatus, and clears the first location information according to the instruction.